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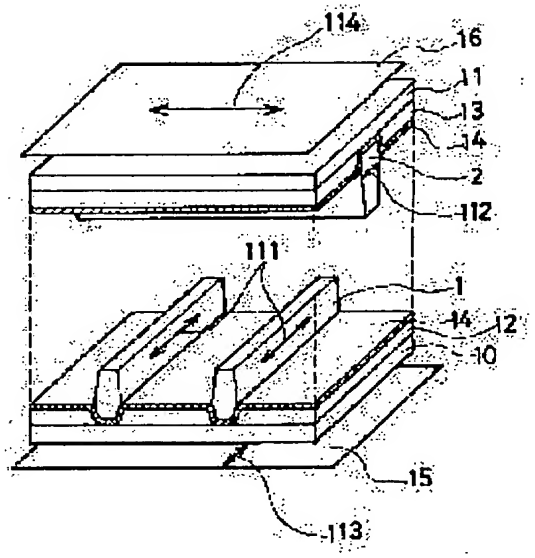
(54) LIQUID CRYSTAL DISPLAY PANEL

(57)Abstract:
PROBLEM TO BE SOLVED: To make it possible to precisely control the thickness of liquid crystal layer by imparting light shieldability to spacer disposed between display pixel electrodes and arranging the spacer so as to intersect both upper and lower substrates.
SOLUTION: Liquid crystalline polymer is patterned on the respective inside surfaces of two sheets of substrates 10, 11 facing each other and the liquid crystalline polymers 1, 2 are formed in the position aligned to the parts where the display pixels do not exist. These polymers are used as the spacers. The molecular orientation of the liquid crystalline polymers 1, 2 is unified constant by rubbing, etc., and is aligned to the polarization axes of polarizing plates 15, 16, by which the light shieldability is imparted to the panel. Namely, the display pixels are formed in the intersected parts of the transparent conductive films 12 patterned to a column form and transparent conductive films patterned to a row form. The liquid crystalline polymers 1, 2 are so disposed in a stripe form as to be respectively aligned to the transparent conductive films 11, 12. The thickness of the liquid crystal layer is controlled by the intersected parts of the liquid crystalline polymers 1, 2.



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CLAIMS

[Claim(s)]

[Claim 1] The 1st substrate with which the 1st transparence electric conduction film was formed, and the 2nd substrate with which the 2nd transparence electric conduction film was formed are made to counter. Are the liquid crystal display panel which pinches liquid crystal, and one [at least] substrate of the 1st substrate and the 2nd substrate has a liquid crystallinity polymer to the agenesis field in which the

transparence electric conduction film is not formed. The liquid crystal display panel characterized by said liquid crystallinity polymer controlling the clearance between the 1st substrate and the 2nd substrate.
[Claim 2] The 1st substrate with which the 1st transparence electric conduction film was formed, and the 2nd substrate with which the 2nd transparence electric conduction film was formed are made to counter. Are the liquid crystal display panel which pinches liquid crystal, and the 1st substrate has the 1st stripe-like liquid crystallinity polymer to the agenesis field in which the 1st transparence electric conduction film is not formed. The 2nd substrate is a liquid crystal display panel characterized by having the 2nd stripe-like liquid crystallinity polymer to the agenesis field in which the 2nd transparence electric conduction film is not formed, and controlling the clearance between the 1st substrate and the 2nd substrate by the intersection of said 1st and 2nd liquid crystallinity polymer.
[Claim 3] It is the liquid crystal display panel according to claim 1 or 2 by which the 1st substrate has the 1st polarizing plate, the 2nd substrate has the 2nd polarizing plate, and the direction of molecular orientation of a liquid crystallinity polymer is characterized by being equal to the polarization shaft of the 1st or 2nd polarizing plate.

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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the configuration of the spacer made inherent in a display in more detail about the spacer which controls the thickness of the liquid crystal layer in a liquid crystal display panel.
[0002]
[Description of the Prior Art] A rapid-response rate, quality image display, and a larger angle of visibility have been required more of a liquid crystal display panel as the use range spreads as a thin display. In order to satisfy these demands, it is indispensable to make small the thickness and its thickness dispersion of a liquid crystal layer.
[0003] Generally the approach of making the thing of the shape of the shape of a ball which consists of plastics or glass into the adhesives for pasting up two substrates which counter as an approach of controlling the thickness of this liquid crystal layer conventionally, or a fiber intermingled as a spacer, and the so-called immanency spacer controlled by making it distribute in a liquid crystal layer, and making a spacer intermingled are used.
[0004] Furthermore, a means to patternize a photopolymer the shape of a dot and in the shape of a stripe forms on a substrate the coat which becomes JP,62-54227,A from silicon nitride or oxidation silicon, and is indicated by JP,62-262024,A which carried out patterning of this on the stripe.
[0005] Here, to manufacture the high liquid crystal display panel of display quality, it is necessary to establish the so-called black matrix which suppresses transparency of the light of the agenesis field of the part in which a display pixel electrode does not exist, i.e., the transparence electric conduction film. Then, the invention-in-this-application person indicated the technique which forms the spacer which has the function of a black matrix by publication of unexamined utility model application Heisei 6-76937. This prepares a photopolymer in the agenesis field of the transparence electric conduction film, gives the function of protection-from-light nature to a photopolymer, and played the role of both spacer and black matrix.
[0006]
[Problem(s) to be Solved by the Invention] However, in publication of unexamined utility model application Heisei 6-76937, in order to give protection-from-light nature, it had to be dyed the photopolymer and had to pass through the dyeing process after photopolymer formation. Moreover, in order to choose the photopolymer which is easy to be dyed, it was difficult to choose the resin which the photopolymer which can be used is restricted and has mechanical strength required as a spacer. Moreover, it also had problems, such as contamination to the substrate by the dyeing process.
[0007] The purpose of this invention is offering the liquid crystal display panel structure which the above-mentioned technical problem's is solved and can control the thickness of a liquid crystal layer to a precision.
[0008]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the liquid crystal display panel in this invention The 1st substrate with which the transparence electric conduction film was formed, and the 2nd substrate with which the 2nd transparence electric conduction film was formed are made to counter. It is the liquid crystal display panel which pinches liquid crystal, and one [at least] substrate of the 1st substrate and the 2nd substrate has a liquid crystallinity polymer to the agenesis field in which the transparence electric conduction film is not formed, and he is trying for a liquid crystallinity polymer to control the clearance between the 1st substrate and the 2nd substrate.
[0009] Moreover, a stripe-like liquid crystallinity polymer may be prepared in both the 1st substrate and the 2nd substrate, and the clearance between both substrates may be controlled by the intersection of the liquid crystallinity polymer of the 1st substrate, and the liquid crystallinity polymer of the 2nd substrate.
[0010] Moreover, desirably, the 1st substrate has the 1st polarizing plate, the 2nd substrate has the 2nd polarizing plate and the direction of molecular orientation of a liquid crystallinity polymer makes it equal to one polarization shaft of the 1st or 2nd polarizing plate.
[0011]
[Embodiment of the Invention] the part to which a liquid crystallinity polymer is patternized to each inside of two substrates which counter, and a display pixel does not exist in it in the liquid crystal display panel in this invention, and the adjusted location — a liquid crystallinity polymer — forming — this — a spacer — carrying out — in addition — and by rubbing etc., the molecular orientation of a liquid crystallinity polymer is arranged uniformly, and protection-from-light nature is given by being in agreement with the polarization shaft of a polarizing plate in it.
[0012] Although the usual orientation arts, such as rubbing, are applicable in order to arrange the molecular orientation of a liquid crystallinity polymer in the fixed direction, after forming a liquid crystallinity polymer, orientation processing of the liquid crystallinity polymer top may be carried out, before forming a liquid crystallinity polymer, orientation processing of the substrate top may be carried out, and a liquid crystallinity

polymer may be formed on it.
[0013] Moreover, the organic orientation film may be prepared with a liquid crystallinity polymer, and orientation processing may be carried out to coincidence.
[0014]
[Example] Hereafter, the example in the liquid crystal display panel of this invention is explained in full detail based on a drawing.
[0015] Drawing 1 is the perspective view which expanded some liquid crystal display panels in one example of this invention. Drawing 2 (a) is the top view showing the liquid crystal display panel in one example of this invention, and drawing 2 (b) is the sectional view. Moreover, drawing 3 is the sectional view showing the manufacture approach in order of a process.
[0016] The structure of the liquid crystal display panel in the example of this invention is first explained using drawing 1 and drawing 2 (a), and (b).
[0017] As shown in drawing 2 , the display pixel 5 is formed in a part for the intersection of the 1st transparence electric conduction film 12 by which patterning was carried out to seriate, and the 2nd transparence electric conduction film 13 by which patterning was carried out to behavior.
[0018] The 1st liquid crystallinity polymer 1 and the 2nd liquid crystallinity polymer 2 were formed in the shape of a stripe so that it might have consistency, respectively on the 1st transparence electric conduction film 11 and the 2nd transparence electric conduction film 12. The 1st substrate and 2nd substrate have the 1st polarizing plate 15 and 2nd polarizing plate 16, respectively, and they performed orientation processing so that the molecular orientation (111 112) of the 1st liquid crystallinity polymer 1 and the 2nd liquid crystallinity polymer 2 might become in the same direction as the polarization shaft 113 of the 1st polarizing plate further.
[0019] Although the direction of molecular orientation of the 1st and 2nd liquid crystallinity polymer was doubled with the polarization shaft of the 1st polarizing plate in this example, the molecular orientation of both liquid crystallinity polymers may be doubled, and the molecular orientation of the 1st and 2nd liquid crystallinity polymer may be changed into the polarization shaft of the 2nd polarizing plate according to the polarization shaft of each polarizing plate, respectively. Moreover, although the polarization shaft of the 1st and the 2nd polarizing plate was set up in this example so that it might become perpendicular, you may set up in parallel.
[0020] The thickness of the liquid crystal layer 6 is controlled by the intersection 3 of the 1st liquid crystallinity polymer 1 and the 2nd liquid crystallinity polymer 2.
[0021] The manufacture approach of the liquid crystal display panel by this invention which used and explained drawing 1 below is explained in full detail using drawing 3 .
[0022] On the 1st substrate 10 which formed the 1st transparence electric conduction film 12 since a liquid crystal display panel was constituted as first shown in drawing 3 (a), polyimide 14 is formed in a display screen part at the thickness of 30-100nm, using print processes as organic film for carrying out orientation of the liquid crystal, it heat-treats at the temperature of 200-350 degrees C, and imide-ization of polyimide 14 is performed.
[0023] As shown in drawing 3 (b) below, a liquid crystallinity polymer is formed so that it may exist between the 1st transparence electric conduction film 12.
[0024] The so-called object for active matrices, the object for simple matrices, or whichever is sufficient as the substrate at this time.
[0025] Next, as orientation processing for controlling the array direction of liquid crystal, rubbing processing is performed to both polyimide 14 and the liquid crystallinity polymer 1.
[0026] Similarly, the 2nd transparence electric conduction film 13, polyimide 14, and the 2nd liquid crystallinity polymer 2 are formed in the 2nd substrate 11, and rubbing processing is performed to it.
[0027] And as shown in drawing 3 (c), the 1st substrate 10 and 2nd substrate 11 are piled up through the adhesives printed by the position. And liquid crystal is poured in between the 1st substrate 10 and the 2nd substrate 11, and an injected hole is closed so that this liquid crystal may not begin to leak, as both substrates are pinched, the 1st polarizing plate 15 and 2nd polarizing plate 16 are set up, and the liquid crystal display panel by this invention is obtained.
[0028] In addition, a different ingredient may be used although the 1st liquid crystallinity polymer 1 and the 2nd liquid crystallinity polymer 2 which were mentioned above used the same ingredient.
[0029]
[Effect of the Invention] Protection-from-light nature was given to the spacer formed between display pixel electrodes in the liquid crystal display panel of this invention by the above explanation so that clearly, and it arranges so that both the substrates of the upper and lower sides of this may be intersected.
[0030] it is possible to control the thickness of the liquid crystal layer of a liquid crystal display panel by this to a precision very much — becoming — in addition — and while the homogeneity of display screen internal division cloth becomes good, it becomes possible to prevent transparency of an unnecessary light completely.
[0031] Moreover, since a spacer is not made to dye in order to take out protection-from-light nature, there are no problems, such as contamination to the substrate by the dyeing process. And especially a liquid crystallinity polymer is resin which has rigidity also in resin, and can realize sufficient reinforcement as a spacer. Moreover, since it has the same molecule frame as the liquid crystal pinched to a substrate, good matching is shown also to a liquid crystal ingredient. And in case the organic orientation film is used, since orientation also of the molecule of a liquid crystallinity polymer is carried out to coincidence, simplification of a production process is possible [it is orientation down stream processing of the organic orientation film and].

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view showing the liquid crystal display panel in the example of this invention.
[Drawing 2] It is the drawing in which the liquid crystal display panel in the example of this invention is shown.

[Drawing 3] It is the sectional view showing the production process of the liquid crystal display panel by this invention in order of a process.
[Description of Notations]
1 1st Liquid Crystallinity Polymer
2 2nd Liquid Crystallinity Polymer
3 Intersection
5 Pixel Electrode
6 Liquid Crystal Layer
10 1st Substrate
11 2nd Substrate
12 1st Transparence Electric Conduction Film
13 2nd Transparence Electric Conduction Film
14 Organic Orientation Film
15 1st Polarizing Plate
16 2nd Polarizing Plate
111 The Direction of Molecular Orientation of 1st Liquid Crystallinity Polymer
112 The Direction of Molecular Orientation of 2nd Liquid Crystallinity Polymer
113 Polarization Shaft Orientations of 1st Polarizing Plate
114 Polarization Shaft Orientations of 2nd Polarizing Plate

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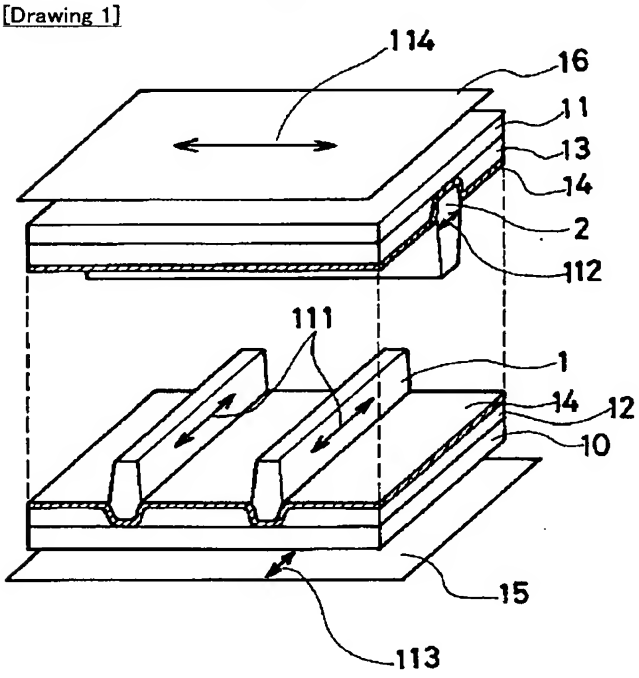
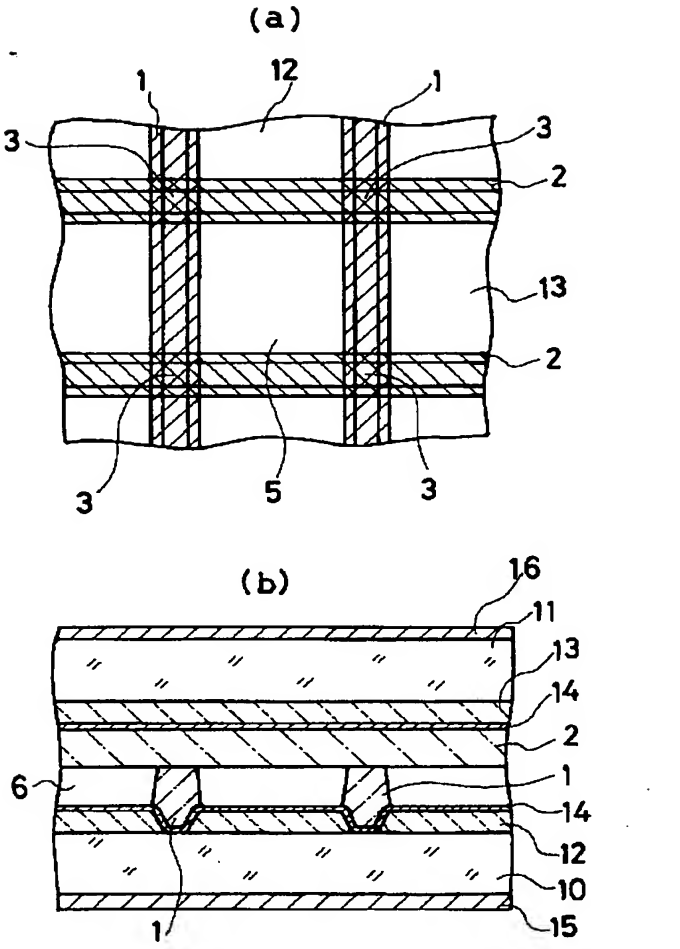
DRAWINGS

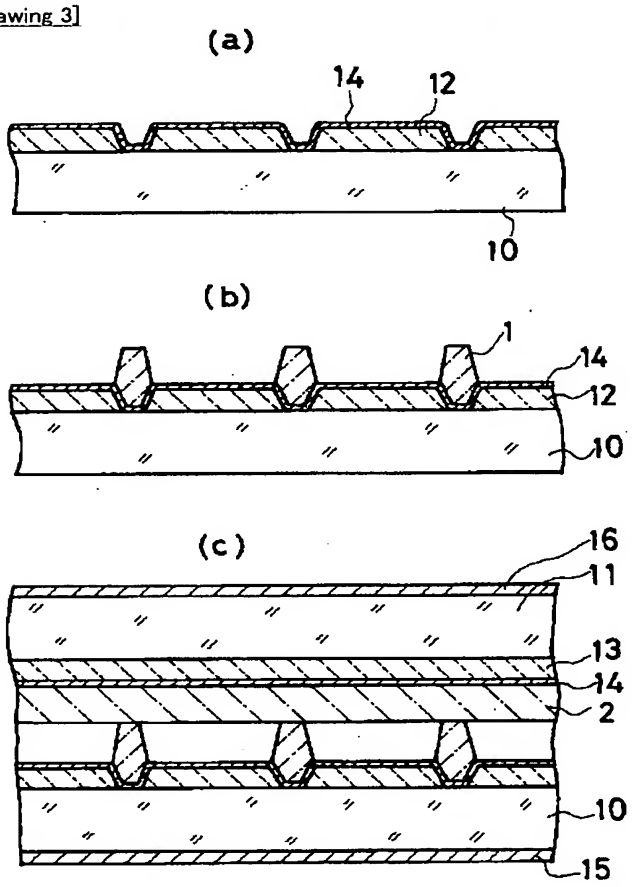
[Drawing 1]



[Drawing 2]



[Drawing 3]



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	1/1335	５００			1/1335	５００	

審査請求　未請求　請求項の数３　ＯＬ　（全５頁）

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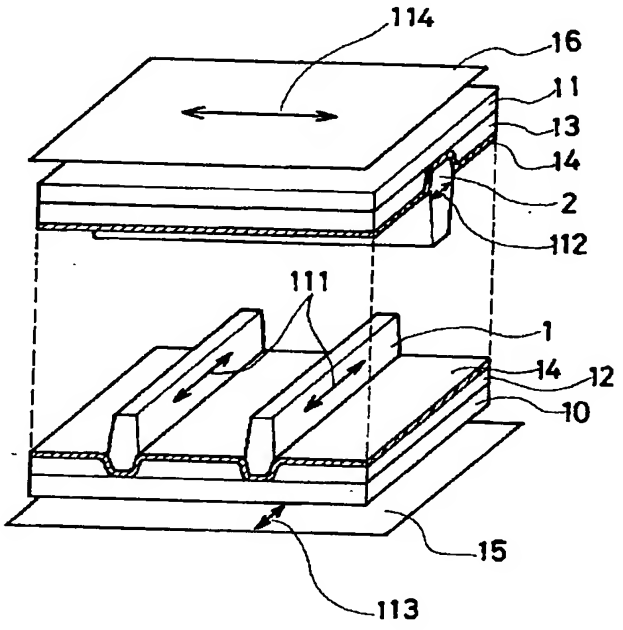
(54)【発明の名称】　液晶表示パネル

(57)【要約】
【課題】　液晶表示パネルの液晶層の厚さを、非常に精密に制御することが可能となり、なおかつ表示画面内分布の均一性が良好になると同時に、不要な光の透過を完全に防止する。
【解決手段】　基板に透明導電膜を形成し、その非形成領域には、液晶性ポリマーの分子配向方向を偏光板の偏光軸と一致させるように、液晶性ポリマーを形成する。液晶性ポリマーは両基板の隙間を制御し、かつブラックマトリックスとしての機能をも有する。



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【特許請求の範囲】

【請求項１】　第１の透明導電膜が形成された第１の基板と、第２の透明導電膜が形成された第２の基板とを対向させ、液晶を挟持する液晶表示パネルであって、第１の基板および第２の基板の少なくとも一方の基板は透明導電膜が形成されていない非形成領域に液晶性ポリマーを有し、前記液晶性ポリマーが第１の基板と第２の基板との間の隙間を制御することを特徴とする液晶表示パネル。

【請求項２】　第１の透明導電膜が形成された第１の基板と、第２の透明導電膜が形成された第２の基板とを対向させ、液晶を挟持する液晶表示パネルであって、第１の基板は第１の透明導電膜が形成されていない非形成領域にストライプ状の第１の液晶性ポリマーを有し、第２の基板は第２の透明導電膜が形成されていない非形成領域にストライプ状の第２の液晶性ポリマーを有し、前記第１と第２の液晶性ポリマーの交差部で第１の基板と第２の基板との間の隙間を制御することを特徴とする液晶表示パネル。

【請求項３】　第１の基板は第１の偏光板を有し、第２の基板は第２の偏光板を有し、液晶性ポリマーの分子配向方向が、第１または第２の偏光板の偏光軸と等しいことを特徴とする請求項１または２に記載の液晶表示パネル。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、液晶表示パネルにおける液晶層の厚さを制御するスペーサに関し、さらに詳しくは表示部に内在させるスペーサの構成に関している。

【０００２】

【従来の技術】液晶表示パネルには、薄型ディスプレイとしてその利用範囲が広がるにつれてより早い応答速度、高品質な画像表示、そしてより広い視野角が要求されてきている。これらの要求を満足させるためには、液晶層の厚さ、およびその厚さばらつきを小さくすることが必要不可欠である。

【０００３】従来この液晶層の厚さを制御する方法として、対向する２枚の基板を接着するための接着剤中にプラスチックやガラスからなる球状やファイバー状のものをスペーサとして混在させる方法や、スペーサを液晶層内に分散させ混在させることにより制御するいわゆる内在スペーサ法が一般的に用いられている。

【０００４】さらに、感光性樹脂をドット状あるいはストライプ状にパターン化する手段が特開昭６２－５４２２７号公報に、窒化珪素や酸化珪素からなる被膜を基板上に形成し、これをストライプ上にパターニングした特開昭６２－２６２０２４号公報に記載されている。

【０００５】ここで、表示品質の高い液晶表示パネルを製造する場合には、表示画素電極の存在しない部分、すなわち透明導電膜の非形成領域の光の透過を抑える、いわゆるブラックマトリックスを設ける必要がある。そこで、ブラックマトリクスの機能を有するスペーサを形成する技術を本願発明者は実開平６－７６９３７で記載した。これは感光性樹脂を透明導電膜の非形成領域に設け、感光性樹脂に遮光性の機能を持たせて、スペーサとブラックマトリックスとの両者の役割を果たすようにしたものであった。

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【０００６】

【発明が解決しようとする課題】しかしながら、実開平６－７６９３７では遮光性を持たせるため、感光性樹脂に染色を施さねばならず、感光性樹脂形成後、染色工程を経なければならなかった。また、染色されやすい感光性樹脂を選択するため、使用できる感光性樹脂が限られ、スペーサとして必要な機械強度を有する樹脂を選択するのが困難であった。また、染色工程による基板への汚染等の問題をも有していた。

【０００７】本発明の目的は、上記課題を解決して、液晶層の厚さを精密に制御することが可能な液晶表示パネル構造を提供することである。

【０００８】

【課題を解決するための手段】上記目的を達成するするために、本発明における液晶表示パネルは、透明導電膜が形成された第１の基板と、第２の透明導電膜が形成された第２の基板とを対向させ、液晶を挟持する液晶表示パネルであって、第１の基板および第２の基板の少なくとも一方の基板は透明導電膜が形成されていない非形成領域に液晶性ポリマーを有し、液晶性ポリマーが第１の基板と第２の基板との間の隙間を制御するようにしている。

【０００９】また、第１の基板と第２の基板との両方にストライプ状の液晶性ポリマーを設け、第１の基板の液晶性ポリマーと第２の基板の液晶性ポリマーとの交差部で、両基板との間の隙間を制御してもよい。

【００１０】また望ましくは、第１の基板は第１の偏光板を有し、第２の基板は第２の偏光板を有し、液晶性ポリマーの分子配向方向が、第１または第２の偏光板のいずれかの偏光軸と等しくする。

【００１１】

【発明の実施の形態】本発明における液晶表示パネルにおいては、対向する２枚の基板のそれぞれの内面に、液晶性ポリマーをパターン化して、表示画素の存在しない部分と整合した位置に液晶性ポリマーを形成し、これをスペーサとし、なおかつラビング等により、液晶性ポリマーの分子配向を一定に揃え、それを偏光板の偏光軸と一致することによって遮光性を持たせるようにする。

【００１２】液晶性ポリマーの分子配向を一定方向に揃えるには、ラビング等の通常の配向処理方法が適用できるが、液晶性ポリマーを形成した後に、液晶性ポリマー上を配向処理してもよいし、液晶性ポリマーを形成する

前に、基板上を配向処理させておき、その上に液晶性ポリマーを形成してもよい。

【００１３】また、液晶性ポリマーと共に有機配向膜を設け、同時に配向処理をしても構わない。

【００１４】

【実施例】以下、本発明の液晶表示パネルにおける実施例を図面に基づいて詳述する。

【００１５】図１は本発明の一実施例における液晶表示パネルの一部を拡大した斜視図である。図２（ａ）は本発明の一実施例における液晶表示パネルを示す平面図であり、図２（ｂ）はその断面図である。また、図３はその製造方法を工程順に示す断面図である。

【００１６】まず図１および図２（ａ）、（ｂ）を用いて、本発明の実施例における液晶表示パネルの構造を説明する。

【００１７】図２に示すように、列状にパターニングされた第１の透明導電膜１２と、行状にパターニングされた第２の透明導電膜１３との交差部分に、表示画素５が形成されている。

【００１８】第１の液晶性ポリマー１と第２の液晶性ポリマー２とは、第１の透明導電膜１１と第２の透明導電膜１２とにそれぞれ整合するようにストライプ状に設けた。第１の基板と第２の基板は、それぞれ第１の偏光板１５と第２の偏光板１６を有し、さらに第１の液晶性ポリマー１と第２の液晶性ポリマー２との分子配向（１１１、１１２）が、第１の偏光板の偏光軸１１３と同一な方向になるように配向処理を施した。

【００１９】本実施例では第１の偏光板の偏光軸に、第１と第２の液晶性ポリマーの分子配向方向を合わせたが、第２の偏光板の偏光軸に、両方の液晶性ポリマーの分子配向を合わせても良いし、それぞれの偏光板の偏光軸に合わせて、第１と第２の液晶性ポリマーの分子配向をそれぞれ変えても良い。また、本実施例では第１と第２の偏光板の偏光軸は垂直になるよう設定したが、平行に設定しても構わない。

【００２０】液晶層６の厚さは、第１の液晶性ポリマー１と第２の液晶性ポリマー２との交差部３によって制御されている。

【００２１】つぎに図１を用いて説明した本発明による液晶表示パネルの製造方法を、図３を用いて詳述する。

【００２２】まず図３（ａ）に示すように、液晶表示パネルを構成するために第１の透明導電膜１２を形成した第１の基板１０上に、液晶を配向するための有機膜としてポリイミド１４を、印刷法を用いて表示画面部分に、３０～１００ｎｍの厚さに形成し、２００～３５０℃の温度で熱処理を行い、ポリイミド１４のイミド化を行う。

【００２３】つぎに図３（ｂ）に示すように、第１の透明導電膜１２の間に存在するように、液晶性ポリマーを形成する。

【００２４】このときの基板は、いわゆるアクティブマトリックス用でも単純マトリックス用でも、どちらでもかまわない。

【００２５】次に液晶の配列方向を制御するための配向処理として、ポリイミド１４と液晶性ポリマー１との両方にラビング処理を施す。

【００２６】同様に第２の基板１１に、第２の透明導電膜１３とポリイミド１４と第２の液晶性ポリマー２とを形成し、ラビング処理を施す。

【００２７】そして図３（ｃ）に示すように、所定の位置に印刷された接着剤を介して、第１の基板１０と第２の基板１１とを重ね合わせる。そして、第１の基板１０と第２の基板１１との間に液晶を注入し、この液晶が漏れ出さないように注入孔をふさぎ、両基板を挟むようにして第１の偏光板１５と第２の偏光板１６を設定し、本発明による液晶表示パネルが得られる。

【００２８】なお、前述した第１の液晶性ポリマー１と第２の液晶性ポリマー２は同一の材料を使用したが、違う材料を用いても構わない。

【００２９】

【発明の効果】以上の説明で明らかなように、本発明の液晶表示パネルにおいては、表示画素電極の間に設けたスペーサに遮光性を持たせ、これを上下の両基板に交差するように配置している。

【００３０】このことにより、液晶表示パネルの液晶層の厚さを、非常に精密に制御することが可能となり、なおかつ表示画面内分布の均一性が良好になると同時に、不要な光の透過を完全に防止することが可能となる。

【００３１】また遮光性を出すために、スペーサを染色させるものではないので、染色工程による基板への汚染等の問題がない。かつ液晶性ポリマーは樹脂の中でも特に剛性を有する樹脂であり、スペーサとしての充分な強度を実現することが可能である。また基板に挟持する液晶と同様な分子骨格を有するため、液晶材料に対しても、良いマッチングを示す。そして有機配向膜を使用する際には、有機配向膜の配向処理工程で、同時に液晶性ポリマーの分子も配向されるので、製造工程の簡略化が可能である。

【図面の簡単な説明】

【図１】本発明の実施例における液晶表示パネルを示す斜視図である。

【図２】本発明の実施例における液晶表示パネルを示す図面である。

【図３】本発明による液晶表示パネルの製造工程を工程順に示す断面図である。

【符号の説明】

１　第１の液晶性ポリマー

２　第２の液晶性ポリマー

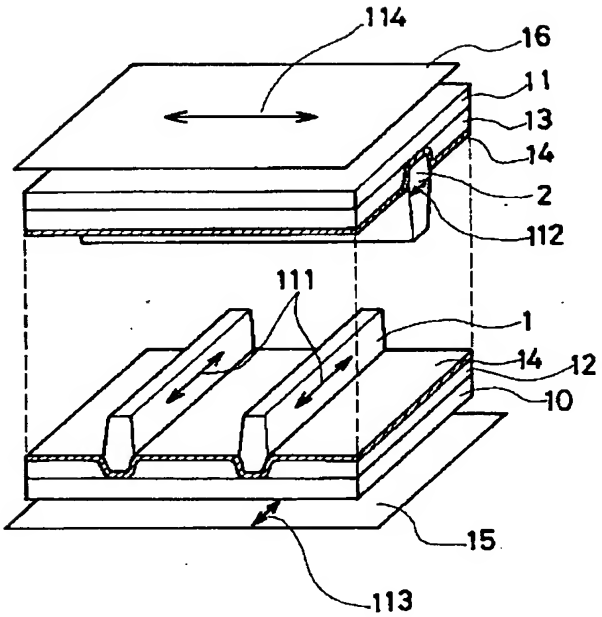
３　交差部

５　画素電極

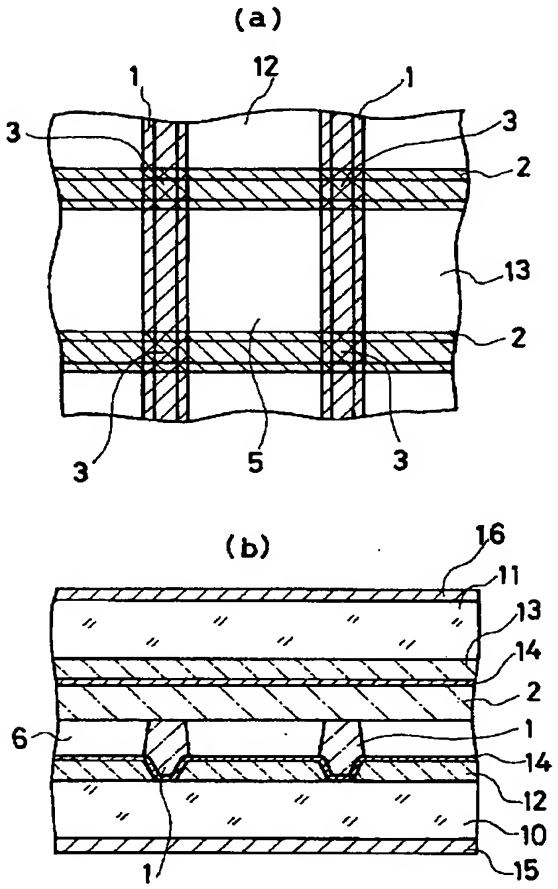
5　　6

６　液晶層
１０　第１の基板
１１　第２の基板
１２　第１の透明導電膜
１３　第２の透明導電膜
１４　有機配向膜
＊１５　第１の偏光板
１６　第２の偏光板
１１１　第１の液晶性ポリマーの分子配向方向
１１２　第２の液晶性ポリマーの分子配向方向
１１３　第１の偏光板の偏光軸方向
＊　１１４　第２の偏光板の偏光軸方向

【図１】



【図２】



【図３】